EMPLOYMENT AND REGIONAL DEVELOPMENT IN FRANCE

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Abstract

We present an econometric analysis, with a cross section sample of 22 French regions, that shows the significant impact of several factors on regional development. The main factors here considered are industry, tourism and public sector activities. The article also analyses the evolution of employment rates in France, in comparison with European Union and USA, as well as the regional distribution of the economic activities that favour employment and economic development. The period of analysis is 1960-2000 for national data and 1985-98 for regional data.

JEL classification: E24, J2, 018, 052, R23

1.- Employment and population in French regions

The regional distribution of population and some economic activities like building and commercial services depend on the regional distribution of employment in industry, public sector, tourism and other variables that influence regional development.

Several interregional econometric models have shown that important increases in real value-added of a region usually provoke an increase in employment and population, favouring a sustained rate of development.

Increases in value-added come usually from non agrarian activities, like industry, public sector activities and tourism, as real value-added in agriculture usually has a lower capability of growth.

In this article we present an analysis of regional development and employment in France, and it will be followed, in next issues, by analysis of another countries.

In this section we present an overview of the evolution of employment in France, in comparison with European Union and USA, as well as an analysis of the regional distribution of rates and densities of non agrarian employment.

Employment and GDP in France 1960-2000: Comparison with EU and USA

Production per inhabitant in France and the 15 countries of the European Union has experienced an important increase during the second half of the 20th century, due to moderation in population growth.

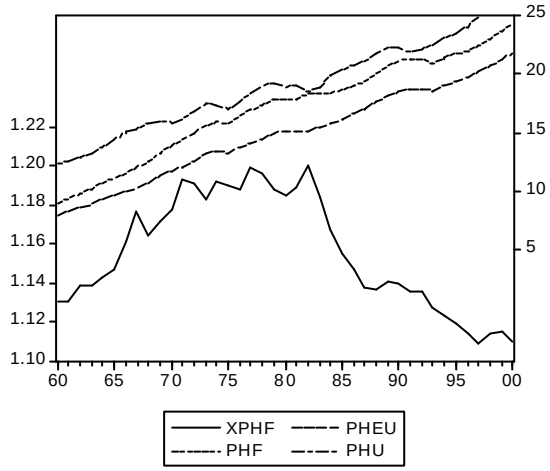
The rate of growth of real Gdp in the EU has not been too high in comparison with world average, but the moderation in population growth, which has been much lower than world average, has allowed a substantial increase in real production per inhabitant

Graph 1 shows the evolution of Gross Domestic Product per inhabitant in France (Phf), the European Union (Pheu), and the USA (Phu), as well as the ratio between Phf and Pheu (Xphf). The left scale represents the ratio and the right scale represents the values of real Gdp per inhabitant.

We can see that the value of France has been superior to that of European Union, but the ratio between both variables decreased during the period 1982-2000, and that both reached a value, in year 2000, nearly three times higher than their real values in 1960.

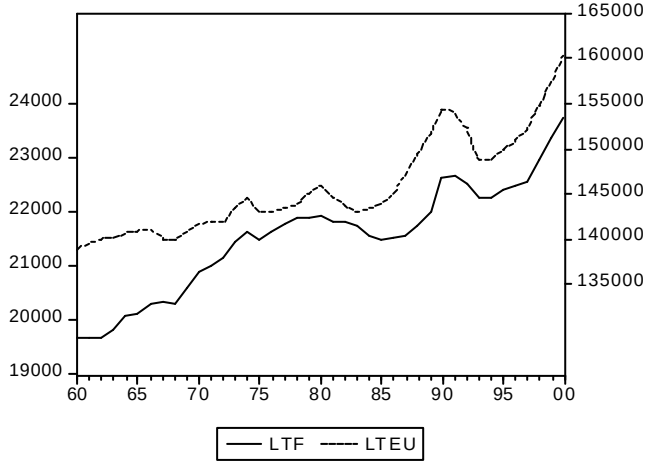
The value of real Gdp per inhabitant of France was very similar in some years to that of the USA, and the similarity would be even higher with data expressed at purchasing power parities instead of at exchange rates.

Graph 1. Gross Domestic Product per inhabitant of France, European Union and USA in 1960-2000 (thousands of dollars at 1990 prices and exchange rates)



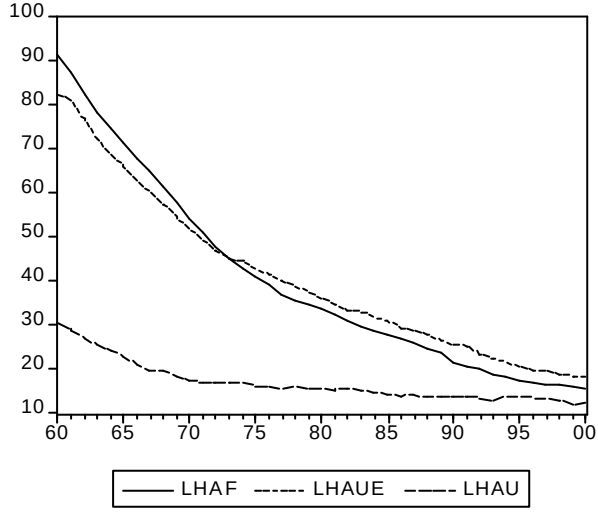
Graph 2 shows the evolution of total employment in France (Ltf) and in the European Union (Lteu) during the same period. The left scale corresponds to France and the right scale to the EU.

Graph 2. Total employment in France and European Union



Graph 3 presents a view of the important transformation in Western European Agriculture, with a change in the level of agrarian employment per one thousand inhabitants in France (Lhf), the European Union (Lheu) and the United States (Lhau). We see that in the period 1960-2000, this rate of agrarian employment lowered its values in Europe to reach similar values to the USA.

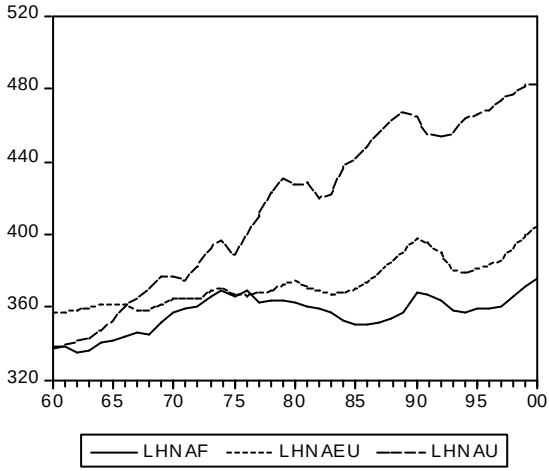
Graphs 3.
Rates of agrarian employment in France, EU and USA
(number of employments per one thousand inhabitants)



Graph 4 presents the evolution of the rates of non-agrarian employment in France (Lhnaf), the European Union (Lhnaeu) and the USA (Lhnau). We see that the EU has rates of employment which are lower than the USA.

That is due both to lower level of production per inhabitant in the EU and to the higher level of production per worker, or labour productivity. In the case of France, labour productivity is much higher than in the EU and the USA.

Graph 4.
Rates of non-agrarian employment in France, EU and USA



In comparison with the USA, France does not achieve a higher level of production per inhabitant in spite of its higher value of productivity per worker. In comparison with the European Union, France has a higher value of production per inhabitant but a lower value rate of employment, which is due to the higher value of productivity per worker.

Because economic policies addressed to increase productivity per worker, and not in production per inhabitant, imply a reduction in the rates of employment, it seems advantageous in the case of France to change the emphasis from increases in production per worker to the more beneficial increases in production per inhabitant. These policies would be good for increasing the rate of employment to reach values similar to those of USA.

The high level of production per worker and per inhabitant is very much concentrated on Paris, and the surrounding region of Ile de France, in comparison with other French areas. In Table 1 we can see that the majority of French regions have a value of production per

inhabitant very similar to EU average, and that only the capital area has an especially high value.

Regional rates of agrarian and non agrarian employment

Table 1 presents the rates of agrarian and non agrarian employment of French regions in 1985 and some related variables.

Table 1. Employment, Population and Production in 1995

Region	Lha	Lhna	Pop	D%	Ph	Rph
Île de France	2	456	10978	0.76	33.5	2
Champagne-Ardenne	32	348	1352	4.45	19.6	37
Picardie	19	322	1855	2.00	17.5	54
Haute-Normandie	14	356	1777	-0.77	22.1	23
Centre	22	352	2433	1.82	19.2	40
Basse-Normandie	37	348	1412	7.11	19.0	45
Bourgogne	26	347	1624	4.12	18.7	47
Nord - Pas-de-Calais	10	314	3995	0.80	18.1	50
Lorraine	11	336	2312	2.02	18.3	48
Alsace	9	374	1690	2.21	22.3	22
Franche-Comté	17	351	1113	3.19	19.0	44
Pays de la Loire	31	340	3140	4.66	19.0	43
Bretagne	37	327	2847	5.36	17.5	55
Poitou-Charentes	35	319	1619	3.25	17.4	58
Aquitaine	33	334	2866	3.75	18.8	46
Midi-Pyrénées	32	343	2494	7.29	18.2	49
Limousin	37	340	719	7.52	17.1	61
Rhône-Alpes	13	373	5569	0.60	20.9	30
Auvergne	32	337	1315	3.81	17.2	60
Languedoc-Roussillon	22	300	2221	6.45	16.5	68
Provence-Alpes-Côte d'Azur	10	331	4428	1.03	19.1	41
Corse	21	308	260	10.55	16.5	67

Note: Lha and Lhna are, respectively, the rates of agrarian and non agrarian employment per one thousand inhabitants, Pop=Population (thousands), D% means % of increase of Lhna during the period 1985-95, Ph=GDP per inhabitant (thousands of dollars at 1990 prices and exchange rates), and Rph=ranking, in descending order, of regional Ph among 103 EU regions. Source: Ratios and Ph calculated by Guisan and Aguayo(2001) from Eurostat statistics.

The regional rates of employment of French regions are usually lower than EU averages, although the production per inhabitant is generally around the EU average, but in the case of Île de France where this variable reaches one of the highest levels, ranking 2 among 103 regions of 15 EU countries. Only the german region of Hamburg reached in 1995 a higher level of production per inhabitant.

In this region, corresponding to Paris, the rate of total employment which was 458 in 1995, is higher than the EU average, which was 417, and the production per inhabitant is much higher than the EU average, with 33.5 thousand dollars at 1990 prices in this region and 19.4 in EU. The only EU region

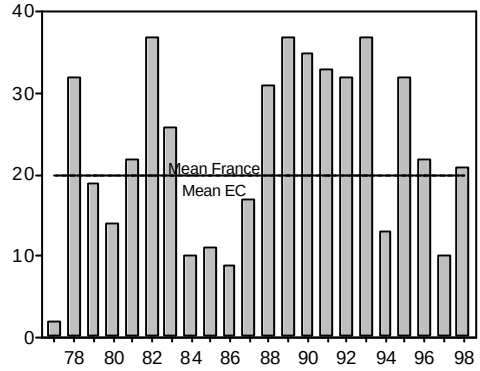
The other regions have values of the rate of total employment for agrarian plus non-agrarian lower than 417, the EU average, and values of Ph similar to the EU average of 19.4. The highest values of production per inhabitant, after the region of Île de France, correspond to Alsace, Haute-Normandie, and Rhône-Alpes

Graphs 5 and 6 show the values of Lha and Lhna of French regions in 1995. The order of the regions is the same of table 1, and the number on the axis correspond to French regions in the list of 103 EU regions included in the study by Guisan and Aguayo(2001)

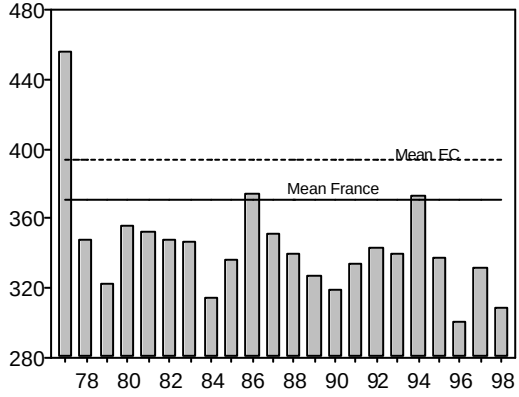
In graph 5 we see that the horizontal lines that represents both EU average and French average coincide in the case of the rate of agrarian employment, although some French regions are clearly above that average.

In graph 6 it is clear the great degree of concentration of non agrarian employment in the region of Île de France, with the majority of the other regions below European Union average.

Graph 5
Rate of agrarian employment in regions of France, 1995
(employment per one thousand inhabitants)



Graph 6
Rate of non-agrarian employment in regions of France, 1995
(employment per one thousand inhabitants)



Source: Guisan and Aguayo(2001). The order of the regions is the same as in table 1, but the figures in X-axis correspond to the French regions ordering of data in the study of 103 EU regions performed by these authors.

Map: Regions of France

Density of Non Agrarian Employment and Population

The distribution of population in European Union territory is very much determined by non-agrarian employment, although other factors, such as the behaviour of retired workers returning to their land of origin if they were emigrants, or going to live in warmer regions if they have lived in very cold regions, also influence that distribution.

At the same time the distribution of non-agrarian employment is mainly determined by the distribution of non-agrarian production. Here we will see that some regions, which are very interesting places to live, have low levels of production and, because of that they do not create enough employment to attract population. It seems it would be beneficial if European and French authorities had a greater concern for the harmonized development of regions, especially in those places where people would like to live.

Here we present the distribution of non-agrarian employment, population and non-agrarian value-added per square kilometre in French regions and we can see the great correlation existing between both variables.

Density of Non agrarian employment

Group 1 corresponds to French regions with a density of non-agrarian employment higher that the national average of 39 employed per Km^2. The first three positions in this group correspond to *Île de France* with 417, *Nord-Pas-de-Calais* with 101 and *Alsace* with 76. This group also includes the regions of *Haute-Normandie* with 51, *Rhône-Alpes* with 47 and *Provence-Alpes-Côte d'Azur* also with 47.

Group 2 corresponds to French regions with an intensity of non-agrarian employment close to the national average of 39 employed per Km^2: *Bretagne* with 34, *Pays de la Loire* with 33, *Lorraine* also with 33, *Picardie* with 31, and *Basse-Normandie* with 28.

Group 3 corresponds to French regions with an intensity of non-agrarian employment lower than 25 employed per Km^2: *Langedoc-Rousillon* with 24, *Franche-Comté* also with 24, *Aquitaine* with 23, *Centre* with 22, *Poitou-Charentes* with 20, *Midi-Pyrénées* with 19, *Champagne-Ardennes* also with 19, *Bourgogne* with 18, *Auvergne* with 17, *Limousin* with 14, and Corse with 9.

Density of Population

Group 1 is formed with regions with density of population per square kilometre higher than the French average of 107 inhabitants per Km^2: *Île de France* with a density of 914 inhabitants per Km^2, followed by *Nord-Pas-de-Calais* with 321 and *Alsace* with 204. Other regions of this group, over national average but with a density lower than 200 are: *Haute-Normandie*, *Provence-Alpes-Côte d'Azur* y *Rhônes-Alpes* with 144, 141 y 127 inhabitants per Km^2 respectively.

Group 2 includes regions with density of population a little lower than the national average of 107. They are: *Bretagne* with 105, *Lorraine* with 98, *Pays de la Loire* also with 98, *Picardie* with 96, *Langedoc-Roussillon* with 81, and *Basse-Normandie* with 80.

Group 3 includes regions with a density of population lower than 80 inhabitants per square kilometre in 1995. They are: *Aquitaine* with 69, *Franche-Comté* also with 69, *Poitou-Charentes* with 63, *Centre* with 62, *Midi-Pyrénées* with 55, *Champagne-Ardennes* with 53, *Bourgogne* with 51, *Auvergne* also with 51, *Limousin* with 42 and Corse with 30.

Density of non-agrarian production

Group 1 is formed by regions with a density of non-agrarian Value-Added, higher than the national average of 1935 million dollars, at 1990 prices, per Km^2. Again the first position corresponds to Île de France with 26320 million per Km^2, followed, with much lower values, by *Nord-Pas de-Calais* with 4767 and *Alsace* with 3715. Also belonging to this group are the following regions with less than 3000 million dollars per Km^2: Haute-Normandie, Provence-Alpes-Côte

d'Azur and Rhônes-Alpes with 2577, 2297, y 2279 millon dollars, per Km2 respectively.

Group 2 includes regions with a non-agrarian Value-Added per Km^2 between 1200 and 2000 million dollars at 1990 prices: *Lorraine* with 1507, *Pays de la Loire* with 1487, *Bretagne* with 1485, *Picardie* with 1417, and *Basse-Normandie* with 1251.

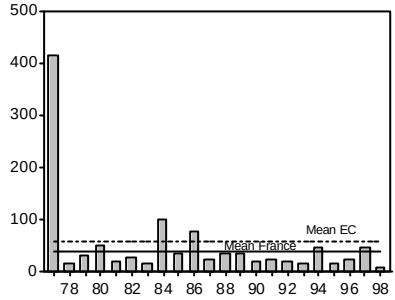
Finally, Group 3 includes regions with a density of Value-Added lower than 1200 dollars: *Franche-Comté* with 1110, *Languedoc-Rousillon* with 1087, *Aquitaine* with 1050, *Centre* with 1005, *Poitou-Charentes* with 893, *Champagne-Ardennes* with 840, *Midi-Pyrénées* with 782, *Bourgogne* also with 782, *Auvergne* with 736, *Limousin* with 612, and *Corse* with 372.

There is a highly positive correlation between the level of population and the levels of employment and income, and so the high density of population in Île de France is mainly due to the high rates of employment and income per inhabitant of this region in comparison with the other ones.

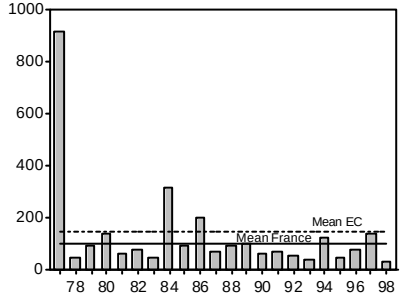
Table 2 and graphs 7 to 9 present a synthesis of the regional distribution of employment and the relation between population and employment.

All of these data show that there is an important concentration of production, employment and population in the region of Paris, and we think that it would be advisable to develop some economic policies for improving the even distribution of these variables in other regions.

Graph 7. Density of non agrarian employment in regions of France, 1995
(employed per Km^2)



Graph 8. Density of population in regions of France, 1995
(inhabitants per Km^2)



Graph 9. Density of non agrarian employment and population
in regions of France, 1995

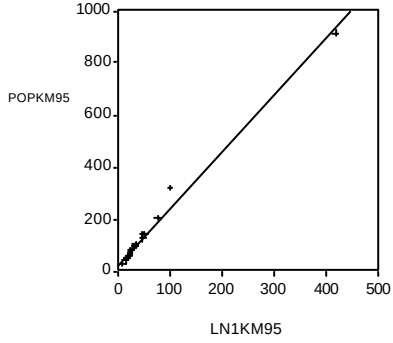


Table 2. Density of non agrarian employment and population in French regions 1995

		DENSITY OF POPULATION				
		>300	200-300	100-200	50-100	<50
DENSITY OF NON AGRARIAN EMPLOYMENT	> 300	Île de France (417/914)				
	100-300	Nord-Pas-de-Calais(100/321)				
	50-100		Alsace (75/203)	Región Wallonne (60/196) Haute-Normandie (51/143)		
	20-50			Rhône-Alpes(47/127) Provence-Alpes-Côted'Azur(46/140) Bretagne(34/105)	Pays de la Loire(33/98) Lorraine(33/98) Picardie(30/96) Basse-Normandie(28/80) Languedoc-Rousillon(24/80) Franche-Comté(24/69) Aquitaine(23/69) Centre(22/62) Molise(22/75) Poitou-Charentes(20/62)	
	< 20				Midi-Pyrénées(19/55) Champagne-Ardenne(18/53) Bourgogne(18/51) Auvergne(17/51)	Limousin(14/42) Corse(9/30)

The share of Île de France in French Gross Domestic Product has increased from 27.56% in 1985, to 29.29% in 1995, showing that the trend of concentration did not diminish during that period.

An economic policy of regional development should take into account that regions without important activity in tourism or other special features, need an improvement in industrial development, and public services, to induce development of demand and supply of another sectors such as building and market services.

In section 2 we analyse the distribution of tourism in French regions, including only hotel statistics. It would be useful to have more data on distribution of secondary dwellings in European regions to analyse non-hotel tourism which is also very important as it has a great influence on the development of activities such as building and commercial services.

We have performed both studies in the case of Spain and the results are very interesting, and we think that it would also be very interesting in France and other European countries which stand out in terms of tourism development.

In section 3 we analyse the territorial distribution of industrial and public sector activities, and we also include some information about the important regional differences that exist in distribution of expenditure in Research and in Development, which have also an important influence in regional development,

In section 4 we present an econometric analysis that show the important significant effect of the above mentioned variables on regional development, and in section 5 we present the main conclusions.

2.- Regional Tourism

France is one of the most important countries in terms of tourism, and this activity creates an important number of jobs, not just directly in restaurants and hotels, but also indirectly on transport, building, and other business and commercial activities.

At European Union level the average number of overnight stays per one thousand inhabitants (onsh) at hotels of each region in 1995 was 1943, with the minimum value being 163 and the maximum 17840, from national origin.

The corresponding figures from foreign origin are 2221 for European Union average, 49 for the minimum value and 56554 for the maximum. The total rate of overnight stays from both origins was 4175 on average, with 599 as the lowest value and 64491 as the highest.

Generally there is an important adaptation between demand and supply and the distribution of hotel beds is very much related to the number of overnights stays. The density of hotel beds per Km^2 (hbkm) oscillates in the EU between 0.22 and 162, the regional average being equal to 7, while the overnight stays per Km^2 (onskm) oscillates between 20 and 20509, with a regional average of 969.

Table 3 present the rankings of French regions among 100 European regions of former CEE12 countries, and the following data of tourism in French regions:

Ons = overnight stays in thousands.

Onsh = overnight stays, in units, per one thousand regional inhabitants.

Onshn = equal to Onsh, but only from national origin.

Onshx = equal to Onsh, but only from foreign origin.

Onskm = overnight stays, in units, per squared kilometre.

Table 3. Hotel Tourism indicators in French Regions, 1995
(overnight stays total, per inhabitant, national, foreign and density)

Region	ons	onsh	onshn	onshx	onskm	rons	ronsh
Île de France	41352	3767	1456	2311	3443	4	19
Champagne-Ardennes	1778	1315	869	446	69	80	74
Picardie	1471	793	588	205	76	86	97
Haute Normandie	1885	1061	752	309	153	78	83
Centre	4291	1764	1231	532	110	56	59
Basse Normandie	3467	2455	1783	672	197	63	39
Bourgogne	3937	2424	1498	927	125	59	42
Nord-Pas-Calais	3559	891	620	271	287	62	90
Lorraine	2695	1166	885	281	114	72	79
Alsace	4937	2921	1686	1235	596	53	31
Franche-Comté	1803	1620	1361	259	111	79	64
Pays de la Loire	3979	1267	1097	170	124	58	75
Bretagne	5877	2064	1576	488	216	46	51
Poitou-Charentes	4073	2516	2235	281	158	57	38
Aquitaine	7277	2539	2133	405	176	40	37
Midi-Pyrénées	9966	3996	2786	1210	220	29	15
Limousin	960	1335	1200	135	57	94	73
Rhône-Alpes	14829	2663	1992	670	339	22	33
Auvergne	3214	2443	2214	230	124	68	41
Languedoc-Rousillon	5751	2589	1955	634	210	48	35
Provence-Alps-C.Azur	15922	3596	2012	1583	507	20	22
Corse	1665	6410	4617	1793	192	82	9
Total	144688	2493	1557	936	266		

Note: “onsh” is the ratio between overnight stays (ons) and population while onshn and onshx are similar ratios for ons from national and foreign origin. “onskm” is the number of overnights per Km^2 in the year 1995. “rons” is the ranking position in overnight stays and “ronsh” the position in onsh, in descending order, among 100 regions of former CEE12.

Table 3 includes the ranking positions corresponding to French regions among 100 EU regions, in descending order, so the lowest the number in the ranking corresponds to the highest the value of the variable in comparison with other regions.

The figures in table 2 indicate that several French regions occupy important positions in tourism indicators, the region of Paris being the most outstanding among them as it occupies the 4th position among 100 European regions in terms of number of overnight stays in hotels, with more than 41 million overnight stays.

Among the 100 european regions included in the ranking only the Southeast in the UK, the Balearic Islands in Spain, and Bayern in Germany have higher figures for this variable.

Provence-Alpes-Côte d´Azur occupies second place among French regions in the value of overnight stays, in the year 1995, with almost 16 million, and Rhône-Alpes occupies third position with almost 15 million.

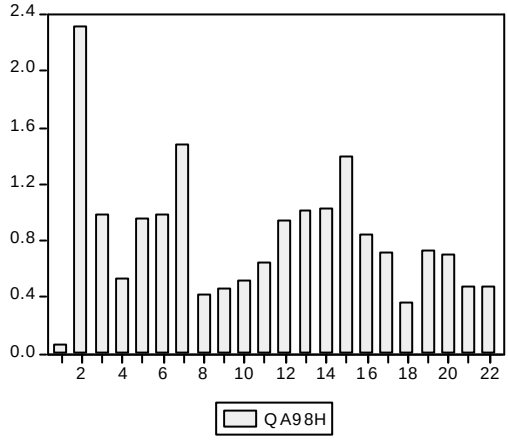
In section 5 we will include a variable related with tourism, onsh, as one of the explanatory variable in an econometric model explaining real value-added of Services. The significant and positive influence of this variable on production also implies a positive influence in employment.

Before that we present in the next section the regional distribution of another variables that influence positively regional development, which are industry and public services, as those sectors will also be included in the econometric analysis of section 4.

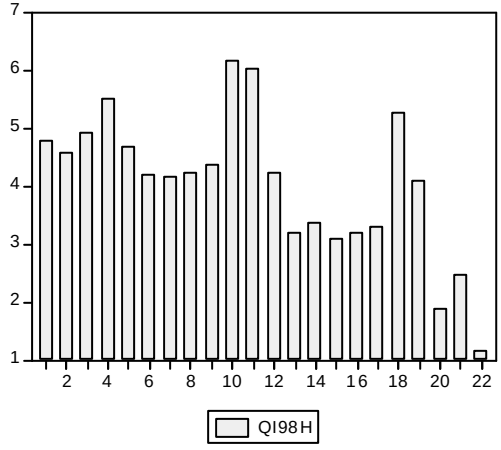
3.- Regional distribution of industry and government services.

Graphs 10 to 12, show the regional distribution of Valued-Added per inhabitant in 1998, corresponding to the following sectors: Agriculture, QA98H, Industry, QI98H, total Services, QS98H, and Non market services, mainly Government services, QG98H.

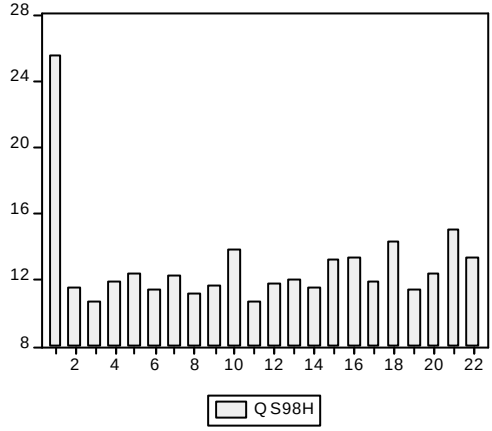
Graph 10
Value-Added of French regions in 1998: Agriculture
(thousands of dollars at 1990 prices and exchange rates per head)



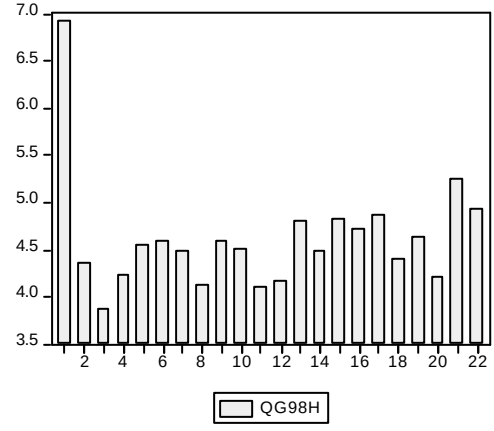
Graph 11
Value-Added of French regions in 1998: Industry
(thousands of dollars at 1990 prices and exchange rates per head)



Graph 12
Value-Added of French regions in 1998: Services
(thousands of dollars at 1990 prices and exchange rates per head)



Graph 13
Value-Added of French regions in 1998: Non-Market Services
(thousands of dollars at 1990 prices and exchange rates per head)



In table 4 we present some available data corresponding to employment in the group of non-market services, which is mainly formed by public sector employment, and expenditure in Research and Development, RD, which is also very much related to the public sector.

Table 4
Employment in non-market services and RD Expenditure

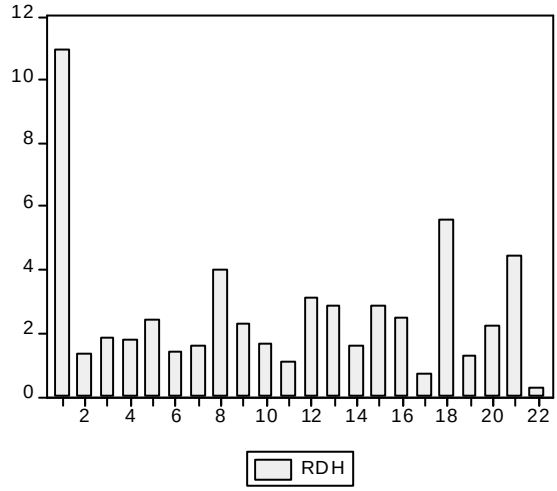
Region	L6	L6h	RDH
1.Île de France	977	92	6085
2.Champagne-Ardenne	97	72	316
3.Picardie	113	63	852
4.Haute-Normandie	120	69	1278
5.Centre	180	76	1006
6.Basse-Normandie	99	71	540
7.Bourgogne	118	74	790
8.Nord-Pas-de-Calais	259	66	367
9.Lorraine	169	74	706
10Alsace	109	67	1013
11.Franche-Comté	78	71	1557
12.Pays de la Loire	208	68	616
13.Bretagne	209	75	1118
14.Poitou-Charentes	119	75	465
15.Aquitaine	207	74	1472
16.Midi-Pyrénées	185	76	2980
17.Limousin	53	74	369
18.Rhône-Alpes	366	69	2027
19.Auvergne	97	74	1629
20.Languedoc-Roussillon	150	71	1370
21.Provence-Alpes-Côte d'Azur	327	77	1923
22.Corse	20	80	109
Total France	4260	76	2470

Note: L6 means thousands of employees in sector 6, from RR6 Eurostat Classification, in year 1990, L6h is the rate per one thousand inhabitants. RDH is the expenditure in Research and Development per inhabitant for the period 1990-94 (dollars at 1990 prices and exchange rates).

In the public sector, French regions have rates of employment similar to the EU average, 77 per one thousand inhabitants. The most prominent region in these terms is Île de France with 92.

Graph 14 shows the great differences among regions in Research and Development expenditure.

Graph 14
Regional distribution of RDH during the period 1990-94



Regarding to expenditure in RD the region of Paris stands out with a value of 6085 dollars of 1990 per inhabitant during the period 1990-94, while the French average was 2470 and some regions received less than 10% the value of Paris. This average was a little higher than EU average expenditure in RD per inhabitant, 2062, and below the USA average that was 2987.

This problem of uneven distribution of RD expenditure could be explained in some cases by the distribution of universities and researchers across the territory, but very frequently in European Union countries, a great concentration can be observed in the capital

region, in a degree superior to the share that corresponds to that region according to scientific criteria.

It would be useful in our opinion to offer opportunities to scientific researchers in other regions, especially in socio-economic research as econometric models show that this type of research has a positive influence on regional development, as shown in Guisan, Cancelo, Aguayo and Diaz(2001).

4. An econometric analysis of regional employment and value-added.

Equation 1 shows the relation between the regional rate of non agrarian employment of French regions in 1998 and the value of production in non agrarian sectors, expressed by means of Value-Added per inhabitant, in thousand dollars at 1990 prices and exchange rates.

This equation includes an intercept and two dummy variables for having into account some small and negative differences in this parameter in two groups of regions:

DN1 is a dummy with value equal to one for regions number 3, 8, 20, 21, and 22, and equal to zero otherwise. DN2 is equal to unity for regions number 13, 14 and 15.

Equations 2 and 3 relate the Value-Added per inhabitant in total Services in the year 1998, QS98H, with the following explanatory variables:

QAI98H = Value-Added of Agriculture and Industry, per inhabitant, in 1990, measured in thousands of dollars at 1998 prices and exchange rates.

QG98H = Value-Added of non market Services, a proxy for government services, per inhabitant, in 1998, measured in thousands of dollars at 1990 prices and exchange rates.

ONSH = Overnight stays of non-residents per inhabitant in 1995, in units, as a proxy for tourism activities.

RDHX = Yearly average of expenditure on Research and Development per inhabitant in the period 1990-94, as a proxy of the level of RD, (dollars at 1990 prices and exchange rates).

Equation 2 does not include dummies for having into account some regional differences while equation 3 includes dummies for three regions with a significant difference: D11 is equal to unity for Franche-Comté, D16 is equal to unity for Midi-Pyrenées, and D19 is equal to unity for Auvergne.

Equation 1.Model for the rate of non agrarian employment

Dependent Variable: LHNA
Method: Least Squares
Sample: 1 22
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
QNA98H	7.782862	0.259333	30.01111	0.0000
C	211.9052	4.944942	42.85291	0.0000
DN1	-23.68303	2.053159	-11.53492	0.0000
DN2	-12.25682	2.467608	-4.967087	0.0001

R-squared	0.987610	Mean dependent var	343.4545
Adjusted R-squared	0.985545	S.D. dependent var	31.26039
S.E. of regression	3.758448	Akaike info criterion	5.648855
Sum squared resid	254.2667	Schwarz criterion	5.847226
Log likelihood	-58.13740	F-statistic	478.2502
Durbin-Watson stat	1.956170	Prob(F-statistic)	0.000000

Equation 2. Model for Value-Added per inhabitant in Services without dummies

Dependent Variable: QS98H
Method: Least Squares
Sample: 1 22
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
QAI98H	0.078922	0.174721	0.451702	0.6569
QG98H	2.283502	0.292076	7.818184	0.0000
NOSH	0.178501	0.238198	0.749382	0.4633
RDHX	5.964372	0.991405	6.016078	0.0000

R-squared	0.906359	Mean dependent var	12.89979
Adjusted R-squared	0.890752	S.D. dependent var	3.031924
S.E. of regression	1.002134	Akaike info criterion	3.005105
Sum squared resid	18.07689	Schwarz criterion	3.203477
Log likelihood	-29.05616	Durbin-Watson stat	2.424870

Equation 3. Model for Value-Added per inhabitant in Services, with dummies for some regions

Dependent Variable: QS98H
Method: Least Squares
Sample: 1 22
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
QAI98H	0.307096	0.104805	2.930161	0.0103
QG98H	1.887207	0.173889	10.85293	0.0000
NOSH	0.476571	0.138925	3.430412	0.0037
RDHX	7.274960	0.579467	12.55457	0.0000
D11	-2.116273	0.608586	-3.477358	0.0034
D16	-3.057356	0.623038	-4.907176	0.0002
D19	-2.364779	0.560484	-4.219173	0.0007

R-squared	0.977001	Mean dependent var	12.89979
Adjusted R-squared	0.967802	S.D. dependent var	3.031924
S.E. of regression	0.544045	Akaike info criterion	1.873801
Sum squared resid	4.439773	Schwarz criterion	2.220951
Log likelihood	-13.61182	Durbin-Watson stat	2.182999

In equations 1 and 3 the coefficients of the explanatory variables are positive and significant, and the goodness of fit is very high. Equation 3 is preferable to equation 2 as it has into account significant differences of some regions and offers better results for significance of coefficients of the explanatory variables.

White´s heteroskedasticity test allows the acceptance of homocedasticity and thus supports the least squares estimation.

White´s test for equation 1

White Heteroskedasticity Test:			
F-statistic	1.322309	Probability	0.301710
Obs*R-squared	5.220601	Probability	0.265402

White´s test for equation 2

White Heteroskedasticity Test:			
F-statistic	2.255458	Probability	0.092739
Obs*R-squared	12.78717	Probability	0.119385

White´s test for equation 3

White Heteroskedasticity Test:			
F-statistic	0.409275	Probability	0.920615
Obs*R-squared	6.829710	Probability	0.812701

It is very remarkable the important impact of government services on private services activities, as an increase of one unity in QG98H implies an increase 1.88 in QS98H.

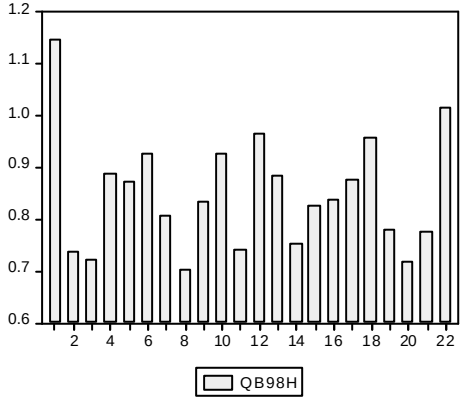
Freeman(2001) re-examines the role of employment and population growth in USA regional development, using recent developments in causality testing for pooled samples, and finds evidence of bivariate causality but support for the "people follow jobs" approach to regional development.

We agree with his view, and thus we emphasize the convenience of improving one or more of the explanatory variables of equation 3 for increasing regional development.

We have not included Building sector in the analysis as, although it has important role on development, in our view it is generally not a cause but a consequence of regional development.

Graph 15 shows the regional distribution of Building sector and equation 3 presents and econometric model for QB98H.

Graph 15
Value-Added of French regions in 1998: Building sector
(dollars at 1998 prices and exchange rates)



Equation 4 presents the estimated relation between the Value-Added in Building sector and the explanatory variables: Value-Added of non Building sectors, QNB98H, and Tourism, using ONSH as a proxy for this sector. It also includes some dummy variables for having into account small differences in the intercept, for regions number 4, 6, 12, 17 and 21.

Equation 4

Dependent Variable: QB98H
Method: Least Squares
Sample: 1 22
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.347832	0.074845	4.647362	0.0004
QNB98H	0.020573	0.004072	5.052067	0.0002
NOSH	0.049136	0.010631	4.621914	0.0004
D12	0.203985	0.059977	3.401051	0.0043
D21	-0.117739	0.059848	-1.967303	0.0693
D4	0.116768	0.060494	1.930249	0.0741
D6	0.112251	0.058860	1.907087	0.0772
D17	0.133854	0.060141	2.225673	0.0430

R-squared	0.822300	Mean dependent var	0.849290
Adjusted R-squared	0.733450	S.D. dependent var	0.110353
S.E. of regression	0.056974	Akaike info criterion	-2.617167
Sum squared resid	0.045444	Schwarz criterion	-2.220424
Log likelihood	36.78884	F-statistic	9.254921
Durbin-Watson stat	2.049486	Prob(F-statistic)	0.000248

White´s test for equation 4

White Heteroskedasticity Test:			
F-statistic	0.470850	Probability	0.867904
Obs*R-squared	5.741488	Probability	0.765487

The regression coefficients are significant and positive for the explanatory variables QNB98H and ONSH, and the goodness of fit is rather good. As well as in the other equations White´s test support the least squares estimation as it does not show evidence against the hypothesis of homoskedasticity.

The most outstanding result in relation with Building sector is the important value of the intercept, which amounts to 41% of the mean of the dependent variable. In this case, as well as in another

samples of different countries, we have found that the regional variability of this sector, in per capita terms, is usually lower than in the other non agrarian sectors.

The significant and positive impact of tourism on this sector is very remarkable too, not only in the case of hotel tourism but also in the case of non hotel tourism. Here the variable ONSH is a proxy for both kinds of tourism activities.

When Value-Added of the other sectors increases usually provokes an important growth in the demand of buildings, both for firms and households. Public sector activities also contributes to the this sector growth, although for a sustained growth the demand side has to be balanced with supply side capacity of the country

5.- Conclusions

Some of the main conclusions that can be remarked from the analysis of the previous sections are the following:

1) France regions have generally a level of production per inhabitant similar to EU average, but lower rates of employment, due perhaps to an excessive priority on productivity increases policies instead of employment growth policies. The case of Île de France is a clear exception with both production per inhabitant and rate of employment above EU averages.

2) Some important variables that influence regional growth are industry, tourism and public services activities. Besides that the level of research and development at regional level, including both the group of natural sciences and engineering and the group of social sciences and humanities, seems to have a significant effect on regional development in French regions.

3) The most outstanding result is the high and positive influence that public sector activities have on market services, so one unity of increase in Value-Added of government at regional level

implies, according to equation 3, an average increase of 0.88 in Value-Added of market services.

Bibliography

Courbis, R. (1979). *Modèles régionaux et modèles régionaux-nationaux*. Actes du II Colloque international d'Econometrie appliquée. Editions Cujas.

Derycke, P. (ed.)(1992) *Espace et dinamiques territoriales*. Economica. París

EUROSTAT. *Base de datos REGIO*.

Freeman, D. G.(2001). Sources of fluctuation in regional growth. *The Annals of Regional Science*, 2001, Vol.35-2, pp. 249-266.

Guisan, M.C. and Aguayo, E. (2001). "Panorama regional y sectorial del empleo en los países de la Unión Europea 1985-2000". *Regional and Pectoral Economic Studies/Estudios Económicos Regionales y Sectoriales*. Vol. 1-1, pp. 9-43. Edited by Euro-American Assoc. of Economic Development Studies.

Guisan, M.C., Cancelo, M.T., Aguayo, E. and Diaz, M.R.(2001). "Educación, investigación y desarrollo regional". See Guisan et al(2001)*Modelos econométricos interregionales de crecimiento de la industria y los servicios en las regiones europeas. 1985-95*. EE4 published by AHG. Distribution: Mundi-Prensa, Madrid.[1]

Schmitt, B.(1999). "Economic Geography and Contemporary Rural Dynamics: An Empirical Test on Some French Regions". *Regional Studies*, vol.33-8. pp.697-711.

[1] A French version may be found at the working paper series Economic Development, no. 66: http://ideas.repec.org/s/eaa/ecodev.html